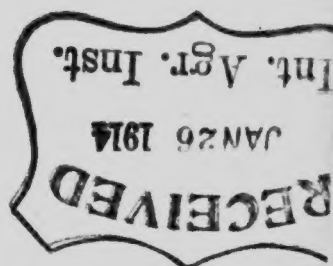


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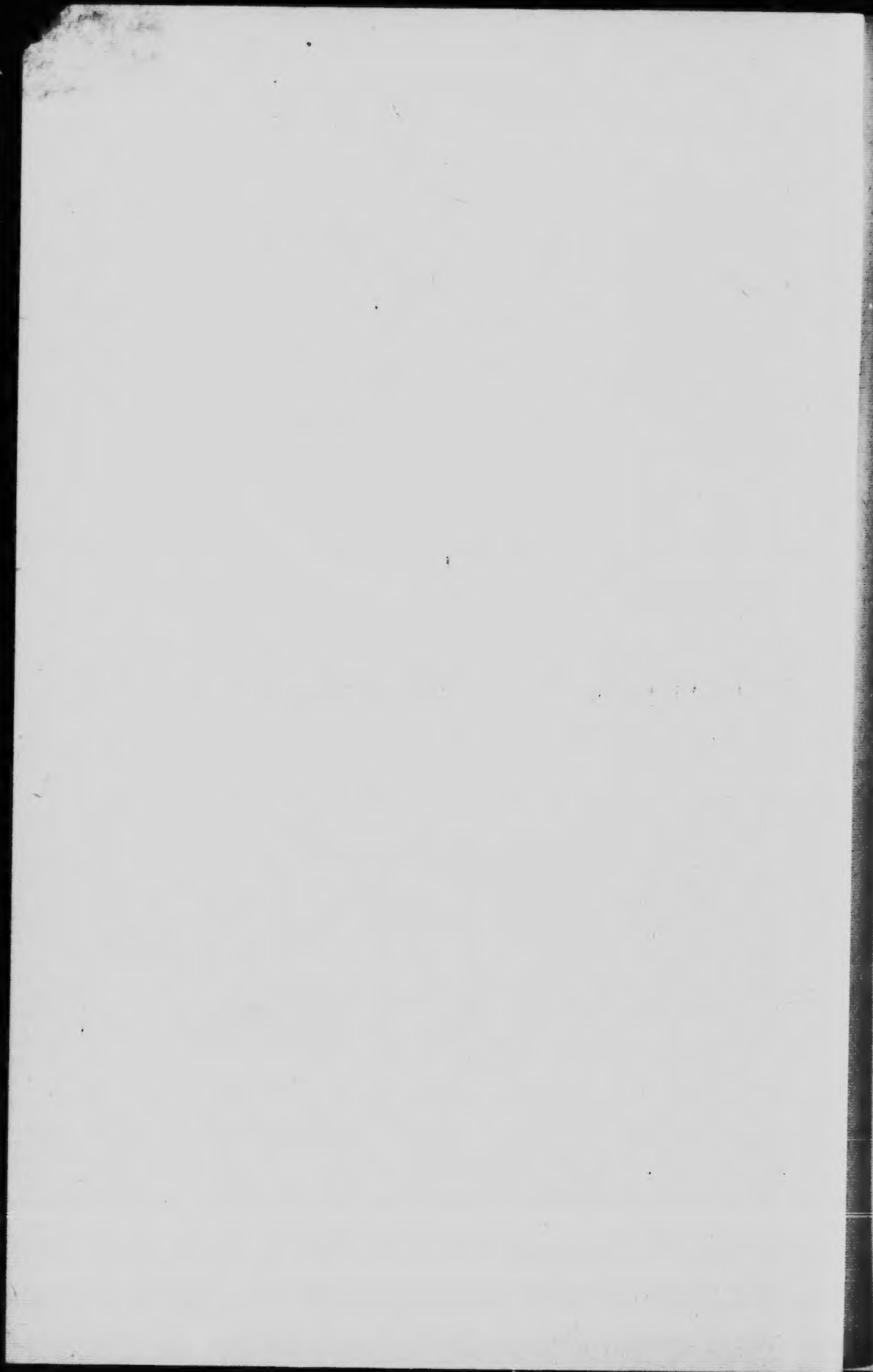
GOVERNMENT OF THE
PROVINCE OF SASKATCHEWAN
DEPARTMENT OF AGRICULTURE
STATISTICS BRANCH

Pioneer Problems

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MINISTER OF AGRICULTURE



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LETTER OF TRANSMISSAL

HON. W. R. MOTHERWELL,
Minister of Agriculture.

DEAR SIR,—Many inquiries reach the Saskatchewan department of agriculture every week as to the best methods of farming to be followed in this province. These inquiries come from new settlers who have taken up land, and desire to start right.

All that we have hitherto been able to supply in response to such inquiries, beyond the limits of a brief letter, are the annual reports and certain other publications of the department which contain articles or addresses dealing more or less directly with the subjects of the inquiries. Some of these publications are now almost out of print and in any case such a method of dealing with specific inquiries is not the most satisfactory.

Pending the issue of technical or educational bulletins on these subjects from the College of Agriculture, Saskatoon, this bulletin, containing extracts from the departmental publications in question and other data in the possession of the department, has been prepared by Mr. Thomas Cromie, of the statistics branch, for general distribution in response to the widespread demand—both within and without the province—for some such publication as evidenced by the inquiries above referred to.

This and the preceding bulletin on Live Stock Raising, together with such bulletins as:

No. 15—Causes of contamination and the care and preservation of milk and cream on the farm,

No. 21—Methods of Soil Cultivation,

No. 24—Hints for Flax Growers,

No. 25—Fleshing Chickens for Market,

No. 30—The Grading of Cream,

No. 31—Farm Weeds and How to Control Them;

will, it is hoped, serve to place the newly located settler on the road to prosperity, and to arouse in him a desire for more complete information as to the essentials of successful farming.

Respectfully submitted,

A. F. MANTLE,
Deputy Minister.

DEPARTMENT OF AGRICULTURE,
Regina, March, 1913.

HINTS TO NEW SETTLERS.

Concerning the Best Methods of Handling Prairie Lands During Early Years of Production.

The fundamental principle of successful farming is proper soil cultivation. Nothing can take its place. If the soil be not prepared in an intelligent way, the most satisfactory results cannot be obtained. Frequently farm lands receive less cultivation than could be profitably performed but often proper implements are not used and those made use of are not managed to the best advantage. The problem of obtaining the maximum of results in cultivation, with the minimum of energy is a most important one.

The object of all soil cultivation is to promote the growth of farm crops. Primarily tillage may be employed either to prepare a seed bed or store up moisture, destroy weeds or improve the texture of the soil but always the same ultimate end is in view—the producing of a satisfactory crop for use by man or beast.

Breaking Prairie Sod.

To the old timer, breaking the prairie sod is not a serious consideration, but to the homesteader it is a most important one, for, if not properly done, it may mean not only the failure of his first crop but a serious reduction of yield on several successive ones.

Two methods are followed: The first and most common one in recent years consists in ploughing the land three or more inches deep and preparing a seed bed for the following spring by packing or rolling and cultivating with disc harrow and drag harrow in the fall. This is known as the “deep breaking” method and is the only one which can be successfully followed on land that is more or less covered with a growth of scrub.

On the open prairie during recent years much land has been broken deeply as early in the season as possible and sown with flax or oats after being cultivated well with the disc and drag harrows. In some seasons the resulting crop shows a profit over the cost of breaking but unless in districts of abundant rainfall, the practice of growing flax on breaking is not to be recommended because it reduces the amount of moisture available for the subsequent grain crop and interferes with the important work of decomposing the tough prairie sod.

The second and most profitable method in the long run of preparing the virgin sod for a crop consists in first ploughing the land in the months of May or June in furrows from 12 to 14 inches wide and as shallow as possible and later, when the sod has become somewhat decomposed, ploughing it in the same direction but 2 or 3 inches deeper than at first. This second ploughing is known as backsetting, and it should soon be followed by the disc harrow to produce the best results. Rolling or packing after the first ploughing will hasten decomposition and make it possible to begin backsetting in August if desired.

Backsetting.

Backsetting is regarded as very heavy work for horses but it provides a means of so preparing land that a more abundant yield may be expected than where the deep breaking system only is followed. In districts of limited rainfall a second crop may be obtained from land broken and backset by burning the stubble the second spring and preparing a seed bed by shallow cultivation with a disc harrow, cultivator and disc drill. In such districts summerfallowing to conserve moisture is usually considered necessary after "deep breaking."

Summerfallowing.

Summerfallowing means the cultivation of the land during one entire season instead of using it for the growing of a crop. As its name implies the operation consists in leaving a field "fallow"—that is empty or idle—during the summer. This can only be accomplished, of course, by means of thorough and frequent cultivation.

Only two good reasons can be advanced on behalf of the practice of summerfallowing: one is its value in the drier districts as a means of storing up moisture for the use of the next season's crop, and the other is its value as a means of destroying weeds—particularly the perennial ones. Contrary to an opinion too commonly held, summerfallowing does not increase the fertility of the soil. The effect of the frequent surface cultivation is to increase largely the stores available of plant food for the succulent crop, which, consequently, is usually heavy, but it does not add materially to the sum total of desirable elements in the soil. On the contrary, the effect of this frequent surface cultivation, which is essential to a good fallow, is to hasten the destruction of humus of vegetable fibre and in this process—known as nitrification—quantities of nitrogen, which is the most valuable element in the soil from the grain growers' standpoint, are set free and pass off into the air. Another result of the summerfallow is to cause blowing or "drifting." This is due also to the frequent surface tillage which is essential if weeds are to be destroyed or held in check and moisture conserved.

It is possible that the second work of the summerfallow—the eradication of weeds—could be done more profitably by a rotation of crops planned with that object in view. There are not lacking men today who have proved this on their own farms and assert it positively. But should this come to be recognised and practised generally it still remains a fact that throughout a large and important part of the Canadian Middle West the summerfallow is essential to successful grain growing and is likely to remain so. These are the semi-arid portions of the country in which summerfallowing is practised with the object of storing up moisture. In these districts, indeed, it is the fundamental operation upon which success is based. The measure of a man's success in such sections as a grain grower is the treatment he accords his summerfallow. Until the fact was discovered that by deep ploughing in June and frequent surface cultivation throughout the growing season a large portion of that season's rainfall could be stored in the upper few feet of soil and held for the use of the crop sown upon that

land in the succeeding spring, millions of acres of rich, fertile land in Central and Southern Saskatchewan, South-western Manitoba, Southern and West-central Alberta were considered useless for agricultural purposes by reason of the deficient rainfall. Now it has been abundantly proved that all these regions can be farmed permanently and profitably by including the bare fallow every third or fourth year in the rotation or scheme of cropping practised by the farmer.

The accepted practice in summerfallow proven to be best under most conditions is as follows: In the fall the field to be fallowed should be disced if possible. This is to conserve soil moisture and start weeds growing. Some weeds will germinate in the fall and be killed by the frosts of winter; most, however, will not start until spring. The discing in the fall assists in either case. Immediately after the completion of seeding the fallow should be ploughed from 5 to 8 inches deep—the deeper the better if conditions are right. It is not advisable to bring to the surface large quantities of the subsoil, so the ploughing should not be at a much greater depth than the land has been ploughed at before. This ploughing should be followed immediately by the sub-surface packer if one is available, and this in turn by the drag harrows. From this time until the close of the season no growth should be allowed to live on the fallow nor should a crust be permitted to form. The drag harrow and duck foot cultivator are the implements best adapted to use in the tilling of the fallow. The disc usually should be avoided as having a tendency to pile the soil up in ridges and also to reduce the surface soil to too fine a condition. The granular rather than a floury condition should be sought after. Some successful farmers practise other methods of fallowing and sometimes soil conditions necessitate a different method, but the foregoing is the one most widely proven to be successful and most generally recommended by authorities.

Fall and Spring Ploughing.

Winter usurps so large a part of the farmer's year that, with the exception of the season at which breaking and summerfallows should be ploughed, the only time available for ploughing is spring or fall—April and May or October and early November.

In the regions of lighter rainfall above outlined fall ploughing is not commonly practised and is not to be recommended without qualifications. Better results usually will be secured by leaving the land untouched until spring that ordinarily would be fall ploughed and at that time burning off the stubble and sowing to wheat after surface cultivation has been given. The reasons that this practice is recommended for these districts are: that the land is usually too dry to admit of being properly ploughed in the fall, and that it is not advisable to plough the land every year because of the loss of moisture which results from the partial burying of a heavy stubble and the general loosening up of a soil previously well packed during the season of fallow. In these districts the land to be spring ploughed usually is that which is to be cropped for the third time since being summerfallowed and any that, from any cause, could not be burned off and surface cultivated. Such ploughing and indeed all spring ploughing should be done shallow and immediately harrowed down.

VARIETIES OF WHEAT GROWN IN SASKATCHEWAN.

Though much of the grain grown in the province is Red Fife, reports from crop correspondents indicate that no small area is sown to other varieties of spring wheat. The following varieties have appeared on crop reports: "Red Fife," "Northern Fife," "Scotch Fife," "White Fife," "Marquis," "Preston," "Stanley," "Club," "Blue Stem," "Huron," "Velvet Chaff," "Percy," "Pringle's Champlain" and "Chelsea." Northern and Scotch Fife wheat are probably only local names for Red Fife as they are practically the same wheat.

According to reports the Red Fife variety was first introduced into Canada by Mr. David Fife, an Ontario farmer, who in 1842 received from a friend in Scotland a small sample of wheat which had been taken from a cargo from Dantzic on the Baltic Sea. This small lot was sown by Mr. Fife as a spring wheat, but it evidently was of the winter variety as only one plant produced heads. The seed from these heads was sown and gave good results. From this small start the Red Fife has become one of the best known varieties on the North American continent. The straw is stiff and of good length, averaging forty-five to sixty inches. The heads average three and a half to four inches in length and are practically beardless, having only about three to seven elongated awns towards the tip and each less than half an inch in length. Spikes, four inches long, are set at a moderate distance apart. There are generally not less than seventeen in a head. The chaff is smooth and usually of a straw colour. The kernels are pale red or amber and of medium size. From this wheat is made an exceptionally strong flour of a rich cream colour, not white as commonly supposed. The popularity of Red Fife is due to the exceptionally strong flour it produces. Other wheats may be a little earlier or yield a little better but none yet have been produced, unless it be "Marquis," which equals Red Fife in milling and baking tests.

"Marquis"—This wheat is the result of a cross between Red Fife (male) and hard Red Calcutta (female). The straw is stiff and of medium length and appears to be very resistant to rust. It ripens about seven to ten days earlier than Red Fife. The head is of medium length, beardless and slightly pointed towards the tip. Its kernels are a dark red, hard, of medium size and somewhat short and stubby. Milling and baking tests show that this wheat is the equal of Red Fife for bread making.

"Blue Stem"—This is a beardless variety. The chaff is white and the kernels red and about medium size. It requires a little longer to mature and does not yield so heavily as Red Fife.

"Preston"—Preston is the result of crossing Ladoga with Red Fife (male). Its kernels are red. It gives a medium sized bearded head, usually about three and seven-eighths inches long. The chaff is yellowish and smooth; the straw stiff and forty-four to fifty inches long. This wheat ripens a few days earlier than Red Fife but is inferior in milling quality.

Four Years' Comparison of Field Lots.

The average yield per acre and time taken to mature of five varieties of spring wheat grown at Indian Head experimental farm in field lots under similar conditions for the past four years are as follows:

Variety	Average days to mature	Days earlier than Red Fife	Average yield per acre	
			Bush.	Lbs.
Preston	127	7	33	52
Huron	125	9	32	51
Stanley	128	6	31	48
Red Fife	134	..	31	22
Marquis	125	9	39	25

VARIETIES OF OATS.

The leading varieties of oats grown in Saskatchewan are the *Banner* and *Abundance*. Each of these is a variety of white oats, having a relatively low percentage of hull and a high percentage of meal.

The following results from tests at the Indian Head experimental farm were obtained in 1911:

Oats—Average and Total Yields.

Variety	Cultivation	Acres	Yield per acre		Total Yield	
			Bush.	Lbs.	Bush.	Lbs.
Abundance	Fallow	16.54	97	3	1,608	..
Banner	Spring Ploughing ..	5.06	58	25	331	..
Banner	Fallow	9.51	93	1	891	12
Banner	Spring Ploughing ..	5.06	51	26	291	28
Improved Ligowo ..	Fallow	10.02	80	..	816	04
Dodds White	Fallow50	54	16	27	08
		46.69	3,965	18

Average yield per acre, 84 bushels, 31 lbs.

GOOD SEED.

(By John A. Mooney, Vice President Canadian Seed Growers' Association, Regina, Sask.)

The subject of good seed should appeal to every farmer who wishes to make a success of his operations, since only by its use can he hope for best results. A man who is fortunate enough to start with clean seed and who gives reasonable care afterwards to the seed he sows, will seldom have his farm mortgaged to his arch-enemy,—weeds, which very often claim one-third of the crop space on the carelessly managed farm.

The questions arise, What is good seed? How, and where can it be secured? To answer these questions we should make a study of the demands of a seed, then when acquainted with what nature requires,

we will be better able to secure seed well suited to those requirements. A grain of wheat may be divided into two distinct parts; the germ or embryo, which is the more essential though smaller part; and the endosperm, which for clearness we will call the "storehouse" of plant food, because in its nature has stored up food to nourish the little plant during germination and until it has power to take plant food from the soil. Then comes the question: At what stage does a plant commence to take food from the soil? Scientists tell us that the plant is dependent on the food stored up in the seed until it develops a green leaf, which may be called the stomach of the plant. This will take five to ten days or longer, during which time heavy demands on the endosperm or "storehouse" of the seed are made, since as yet it is the only source of food for the young plant. The following conclusions are then very obvious:

First—That we should have plump seed in order that we may be sure that it will contain sufficient food to enable the tiny plant to send up a stem that will reach the surface of the ground and develop a good strong leaf. Second—In case the first leaf be destroyed by frost, drought or disease, it is wise to sow a plump seed so that it may be able to give the delicate plant additional help to start again. Third—The plant having to depend on the seed for its first root, requires, if the root is to develop normally and quickly, a good supply of plant food, or, in other words, a large, plump, uninjured seed. A good root development enables the plant to take more moisture from the soil, and also more food, thus giving a much stronger growth and more power to resist disease, drought, frost, etc. Such a plant will also mature earlier.

Secure Large, Plump Seed.

These reasons suggest to us the necessity of having a large, plump seed and demand an answer to the question, what is the best method of securing such a seed. In the first place we should select seed that is thoroughly matured from a field that was free from lodged, frosted or diseased grain, because a good seed must have as a parent a plant of perfect type and one that was well matured in order to insure maximum vitality. Then the seed should be thoroughly graded so that only the plumpest of the seed will be used. Before discussing methods to get plump seed we might consider what a seed requires for growth and how best to help provide these requirements. We all know that for germination, heat, air and moisture are necessary. We should be careful, therefore, not to bury the seed too deeply lest we remove it too far from the heat and air. We should also avoid going to the other extreme, sowing too shallow, thus depriving it of moisture. This emphasises the necessity of cultivating the soil so as to get a good seed bed, one that brings the moisture near the surface, where the heat and air is. Enough surface cultivation should be given to permit and encourage the air and heat from the top and the moisture below to reach the seed, thus providing a condition that will hasten germination and prevent at the same time the escape of moisture by evaporation.

Thorough cleaning and grading with the fanning mill will not alone guarantee a good healthy growth, but it will result in a crop that will ripen more evenly and give a better sample for market. To pro-

duce the best sample for the market we must consider a few other things in order to secure the highest quality. Generally speaking, the seed that is used throughout the province is not pure in variety, consequently some of the plants ripen earlier than others with the result that the colour of the sample is not uniform. Again, some of the plants take longer to mature, and if the field is cut when the average plant is fit to harvest the miniature plants yield shrunken grains. It is apparent, therefore, that we require a seed pure in variety. This is exceptionally hard to secure and very often we may have to use the seed we have until we are able to procure or purchase seed that is pure in this respect.

The production of seed pure in variety is interesting, as well as profitable and the average farmer who does not wish to purchase a high priced seed can, if he chooses, improve his own grain by careful selection. The plan outlined by the Canadian Seed Growers' Association is an easy one to follow. Selecting the best heads of one type or variety out of the crop on one's own farm makes the procuring of good seed less costly than any other method. Enough seed should be selected in this way to sow a quarter of an acre or more. From the matured crop on that quarter of an acre enough to sow another quarter of an acre should be selected and the balance can be sown as the general crop on the farm. The product of the third selection in this way will be eligible for registration if it has been examined and favorably reported on by one of the Canadian Seed Growers' Association inspectors. Those who wish to follow this work should write the secretary of the Canadian Seed Growers' Association, department of agriculture, Ottawa, for further particulars. This work will seem rather tedious to some who have not taken into consideration the advantages to be gained by following it. But when we realize that plants have individual characteristics such as stiff straw, heavy yielding, and rust resisting qualities, and that these are transmitted from generation to generation, we early come to the conclusion that we may improve the yield and quality of our farm crops by the simple if tedious operation of selection. Much can be done along the line of increasing the yield, improving the quality, strengthening the straw and shortening the ripening period. Individual plants prove this. I have noted a variation of several hundred grains in the yield of individual plants growing under similar conditions. This shows us definitely that they have special yielding qualities, which by selection may be taken advantage of by every farmer.

Quality Important.

In purchasing seed it is well to take into consideration the quality of the variety as well as the yield. Some varieties have weak straw and consequently are apt to lodge. Others are more subject to disease and still others take longer to mature. Good straw and heavy yielding qualities are important considerations, but there is in wheat one of still more importance—the variety should be one that produces a high grade of flour, a grade that the market demands. In purchasing a new variety great care should be exercised to see that it has as many of the good qualities and as few of the nondesirable ones as possible. I know of a certain mill that was almost forced out of business, simply because it happened to be in a district where there was wheat that looked good but gave a dark flour and was consequently not in demand.

In oats quality especially should be considered. During the last few years we have been looking for oats that yield well and weigh well per bushel. As a consequence we have many varieties which have poor feeding and milling qualities, simply because we have introduced varieties that look good to the eye but are very thick and heavy in the hull. When we feed our horses three quarts of oats we are simply giving them two quarts of food, the other quart being made up of hull that is practically iron clad and indigestible. An oat should have a thin hull and a comparatively large kernel.

This year many are wondering if their oats are fit for seed and if it is possible to tell frozen oats. The way to distinguish frozen oats is quite simple. Take a single grain and split it in two. If it is frozen you will notice a dark streak running through the meat. This is evidence that the oats are unfit for meal or seed, and that they will not germinate satisfactorily, the germ having been killed. A seed may have all the qualities mentioned above and yet may not grow simply because the germ is injured or killed. If we wish to make sure that our seed is of any value we must find out what percentage will grow. This can be done by taking a box with about two inches of soil in it and sowing in it one hundred grains. Keep the soil moist and warm. The number of plants that grow will give you the percentage of germination, deciding for you whether the seed is fit for use or not. After the frost of last year this is very necessary, as samples of oats that weigh forty pounds per measured bushel are in some instances germinating only two per cent.

Smut in Wheat.

The fact that so much smutted wheat is going on the market this year means that the men who sow the seed do not take as much care as they should to prevent this great loss. It also means that there are yet some men who do not understand thoroughly the best treatment of the seed for the prevention of this disease. The first essential is to have plump, uninjured and clean seed—seed that has no smut balls in it to break in the drill and thus contaminate the treated grain. We next should know that the bluestone is pure or that the formalin is guaranteed to be a forty per cent. solution of formaldehyde. Then we should be careful to weigh which of these we prefer to use and measure the water accurately. The solutions most generally and successfully used are one pound (sixteen ounces) of formalin to thirty-two gallons of water, and one pound of bluestone to six gallons of water. There are some advantages in using the formalin. First—it is a liquid that does not require time to dissolve. Second—the operator does not need to be so particular as to whether the water is hard or soft, and lastly—it leaves the grain in a better condition to germinate quickly.

In treating seed for smut one thing to remember is that thoroughness counts. See that every grain comes in contact with the solution whether you immerse or sprinkle.

Formalin is the only treatment for smut in oats that gives complete satisfaction. To those who are interested in the history of smut, I would refer them to Bulletin No. 2 issued by the agricultural department at Regina.

INQUIRY INTO THE WORK OF THE SOIL PACKER IN SASKATCHEWAN.

Moisture, and its control, is the most important problem of the grain grower throughout a large part of Saskatchewan. Were the moisture supply from the clouds certain and invariable the problem would be simplified, but as conditions are the grain grower who would be successful must plough and work to conserve and store in his fields as much as possible of the moisture that falls on them from time to time. Any system of farming or any tillage implement that will assist him in this work is worthy of his careful consideration. It may not render him sufficient aid to justify any change from existing methods or to warrant the expense of securing such an implement. On the other hand such a change or investment might quickly justify itself.

The summerfallow is an example of a change in the accepted system of farming which has justified itself over and over again from the standpoint of conserving moisture. The drag harrow is an implement which has an universally acknowledged value in the same connection. During recent years, however, a new type of implement has been introduced for which great claims have been made as to its value in helping the farmer to store up his moisture. This is the soil packer. Packers vary widely as to design, construction and method of reaching results, but all have the same general object in view, namely, so to compress the ploughed land that evaporation shall be reduced to a minimum and the free flow of capillary or film water in the soil re-established.

The department of agriculture asked its crop correspondents some questions as to what results could be noted from the use of packers in each one's township. One object in view was setting before those farmers of the province who have not bought a packer as yet and who hesitate to invest so much money in one, the consensus of opinion as to their worth, upon the part of those who already own one. Another object was that those who already have packers might be enabled to compare notes and learn under what conditions and at what stage in the tillage operations the different kinds of packers can best be used.

The questions asked of crop correspondents were as follows:

"On about what percentage of the land under crop in your township this year was a roller or packer of any kind used?"

"What kind of a packer is most used in your township—surface or subsurface?"

"At what stage in the seeding operations is the packer usually used?"

"What effect does the use of a packer appear to have on:

"(a) Soil drifting?

"(b) Even germination (sprouting) of seed?

"(c) Rapid growth of crop?

"(d) Moisture in the top three inches of soil?"

The Extent of Their Use.

The following table will indicate in a general way the extent to which packers of one kind or another are being used in Saskatchewan today. Only the areas upon which surface or subsurface packers or

land rollers have been used are included. Account is not taken of the area upon which "plankers," "floats," "scrubbers," inverted and loaded harrows, or any other device for pulverising alone have been used, as the action of these is not strictly speaking of a packing nature.

Crop District	Percentage of crop area packed	Estimated area under grain crops	Estimated acreage upon which some form of packer was used
1. South eastern.....	12.7	2,479,820	314,940
2. South central.....	13.0	1,032,580	134,230
3. South western.....	11.3	249,430	28,180
4. East central.....	9.2	901,440	82,930
5. Central.....	29.2	1,789,090	522,410
6. West central.....	35.4	414,090	146,585
7. North eastern.....	4.5	85,040	3,825
8. North central.....	8.9	213,500	19,000
9. North western.....	25.6	720,300	184,395
The Province.....	18.2	7,885,200	1,436,495

Surface and Subsurface Packers.

There are two general types of packer—surface and subsurface. The latter is often wrongly called the subsoil packer. No packer works in the subsoil and none is needed there. The surface packer was the first type to be placed upon the market in this country, and is made by a number of implement manufacturers. Its wheels are flat or nearly so and their edges are deeply notched or fingered. The effect of this form of construction upon the surface of the land is to leave it compressed and pulverised, yet not smooth. The subsurface packer is the type used in the semi-arid states to the south and is the kind referred to by Professor Campbell in his writings upon the subject of "dry farming." The wheels of this type instead of being flat are sharply pointed, or V-shaped, and, consequently, as its name also indicates, the work of this packer is done beneath the surface of the land.

According to the correspondents, the surface packer predominates throughout the province at the present time. This was the case in every crop district. In crop district No. 1 (south-eastern), and in district No. 5 (central) there are a large number of subsurface packers used, but even in these districts the surface packer appears to outnumber the other type by two to one.

When Packer is Used.

In the great majority of cases the packer is used after the seed is in the ground. Usually the order is, seeding, harrowing, packing. Sometimes men wait until the grain is coming through the ground and others wait until it is two, three or even four inches high before packing. This applies, of course, to the surface packer. Others report the packer as being used both before and after the drill, while still others state that in their township the practice is to pack only before the drill. In very

few cases did men report that the subsurface packer was being used immediately after the plough in the case of summerfallows and fall ploughing, though this is the time when it would be supposed that this type of packer would do its work best.

Effect of Packer on Soil Drifting.

One of the problems of the grain growers in quite a number of districts is soil drifting. The better they cultivate their summerfallow the more it blows. This condition (in our soils) is due, of course, to the fact that too much of the original vegetable matter, or root fibre, or humus, as it is variously called, has become decomposed and turned into available plant food by the action of tillage methods and implements. The more thorough the tillage, the less vegetable matter is left, consequently there is no binding agent left in the soil and it readily crumbles down into very small particles.

The action and effect of the surface packer upon soil in this condition has been much discussed, so a question on this point was included in the schedule. An analysis of the replies on this point shows that where drifting is at all general and the correspondent has been able to gather data, the judgment of farmers was overwhelmingly to the effect that surface packing tended to check, if not entirely to prevent, soil drifting. There were a few who thought the packer had no effect in this connection, while a few others thought that the action of the packer was to cause the soil to drift worse than before. Absolute agreement cannot be looked for in a canvass of this nature, so that we are justified from this evidence in assuming that the effect of the surface packer, when used after the drill, is to check if not actually to stop soil drifting. Of course, such a remedy is purely mechanical in its nature, and should in no way interfere with the efforts of the farmer to remove the cause of the drifting, namely, the absence of vegetable matter in the soil in sufficient quantities. Certainly the best, and perhaps the only way to remove the cause of drifting is seeding down to some of the grasses or clovers, thus restoring root fibre to the soil.

The Packer and Even Germination.

In many districts this year uneven germination of the earliest sown grain has been sufficiently extensive as to be quite a factor in the crop situation. On many fields there are likely to be two crops ripening two weeks apart instead of only one ripening evenly. As the field can be cut but once, loss, either in quality or quantity of the total crop is bound to result. Therefore a question was asked as to whether the use of the packer after the drill and its tendency to press the soil firmly around the seed as it lay in the ground, had any noticeable effect upon the evenness of germination.

Here again, the replies received were in substantial agreement to the effect that the action of the packer made a noticeable difference in the evenness of the stand of grain obtained. This was an excellent season for a judgment upon this question to be arrived at, and it must be borne in mind that these replies were received, not from men all of whom own packers, but from the regular correspondents of the depart-

ment, some of whom doubtless own one, but most of them certainly do not. All of these farmers, however, had previously been requested to gather what data they could in their township along the lines of these questions.

The fact that the use of a surface packer has so pronounced an effect in aiding even germination would appear to be an additional motive for its use after the drill rather than before, and immediately after the drill rather than (or as well as) after the grain is up.

The Packer and Rapid Growth.

Early fall frosts constitute quite a menace to the crops in a number of districts and anything that has the effect of shortening the growing period of the crop, without detriment to the yield, is worthy of consideration. We now know that shallow cultivation tends to early ripening, while deep cultivation of the soil just before seeding tends to delay the crop. We also know that some varieties of grain mature in a shorter time than do others. Then, too, thick sowing tends to earlier maturity. If the crop can be hastened at the beginning of its life in any way, that is equivalent to hastening the ripening process. Therefore correspondents were asked whether the use of a packer promoted more rapid growth of the crop in its early stages. Almost all the replies were to the effect that the result of packing was to promote a more rapid and stronger growth. The plants on the packed fields were characterised by more vigour and had a healthier appearance. A few men thought there was no difference to be seen while others went into detail and stated that the crops on packed land in their township were from four to ten days further advanced than those on unpacked land.

The Packer and Soil Moisture.

On this point the testimony of correspondents was that the use of a packer tends to bring the soil moisture nearer to the surface and more will be found in the top three inches of soil than if none is used. Consequently there is more plant food in solution available for the use of the young plants of the grain crop. Some were of the opinion that the same result could be reached by the use of the harrow, and that in this respect the packer did not justify its cost. Others stated that they could find no difference in the moisture supply on packed and unpacked land, because it was all too dry. (It is certain that if the soil is almost destitute of moisture the packer cannot bring moisture nearer to the surface.) In other districts there had been such copious rains that all the ground, packed or unpacked, was well supplied with moisture. The emphasis in some cases was laid upon the fact that the surface packer can only do its best work in this or other directions when the land has previously been well cultivated and worked down.

In concluding this summary of the reports received on the packer question it is only fair to say that some correspondents were unable to answer the questions because there were no packers in their township, while others were of the opinion that there was not sufficient difference between crop conditions on packed and unpacked land to justify any attempt to analyse the subject. The overwhelming bulk of testimony,

however, was favourable to the use of the packer. The 1,000 farmers reporting on the question are evidently firmly of the opinion that an intelligent use of some kind of land packer will assist the grain grower in securing good returns from his labour.

It must be remembered, of course, that these replies were mostly based on the results noticed in the one year in question—1910—and that in wetter years as good results might not be obtained and even some harm might result from the indiscriminate use of a packer. Every farmer should secure the Agricultural College and Experimental Farm reports and study out the results obtained one year with another at these places. There is a serious danger that our farmers may overload themselves with machinery which, one year with another, will not on a small farm and with necessarily limited use, repay the money invested in it. For this reason men should be thoroughly satisfied before they purchase it that an implement like a packer (which is not essential, as a plough is, for instance) will pay for itself.

In all the foregoing matter, the attempt has been made to discuss principles rather than practice. Once the principles underlying successful grain production are understood by a man, he can be safely trusted to suit the practice to his particular conditions. The details must be worked out by the individual on his own farm.

THE MARKETING AND SHIPPING OF GRAIN.

(It is useless for the pioneer or any other farmer to attend carefully to all the essentials of producing a good crop, if he is not at the same time fully aware of the best methods of disposing of the grain after it is grown and securing for it the highest possible grade and price. The following article discusses in an authoritative way the more important points connected with the marketing of grain. Every farmer should secure a copy of The Canada Grain Act which is his Bill of Rights as a shipper of grain.)

Copy of an address delivered by Matthew Snow, late Deputy Warehouse Commissioner, Winnipeg:

This is a large question, but I wish to confine myself to a discussion of some of the provisions of The Manitoba Grain Act that more particularly apply to the producer in handling his grain for sale. I shall also discuss our system of grading, how it is carried on at Winnipeg and at the terminal elevators, and point out the different safeguards there are for the detection of possible mistakes before it is too late.

There are several ways in which a farmer may dispose of his grain; he can sell to the elevator companies by the load, store his grain on a graded ticket; or have it put into a special bin and its identity preserved. If he does not wish to use the elevator he can load his grain over the loading platform directly into the car. If the platform should be occupied he can compel the railway company to place his car on the siding at some convenient point for loading.

Obtain Ticket for Each Load.

A farmer selling to the elevator is protected by law in that the elevator operator is required to make out a ticket, as prescribed by the Act, for each and every load. This ticket must show the gross and net weight, the amount of dockage, if any, price per bushel and total amount to be paid for each load. It also gives the owner or party making the delivery the right of free access to the scales, so that he can satisfy himself that his grain is being properly weighed and a correct statement given. In case of a dispute as to the grade or dockage, the owner can demand that a sample of his grain be drawn from the load at the time of delivery, and sealed up and mailed to the chief inspector at Winnipeg, who is required to grade it and assess the dockage on such sample. The inspector's decision is final and binding on each party.

Many farmers are in the habit of asking an elevator operator to make out only one ticket when they deliver several loads at the same time, and where grain is being delivered directly from the thresher, very often an arrangement is entered into between the owner of the grain and the elevator operator that a record shall be kept until the threshing is completed and all deliveries made, when one large ticket covering all the deliveries is made out. I want to warn you against this method. We find it invariably causes trouble and leads to many investigations as to whether the farmer had received a correct statement of the grain delivered. It is very easy for the operator of an elevator, where grain is being delivered in large quantities in the fall of the year, to make a mistake in keeping a proper record of the loads delivered in such a manner, and the farmer himself, while he may attempt to keep tally of his own loads, is usually so busily engaged looking after his threshing that he is often unable to swear positively to the actual number of loads delivered. If a farmer has any suspicion that the elevator operator may be going to take any advantage of him, this is the very way to give him opportunity to do so.

Graded Ticket.

A farmer may store his grain in a country elevator and receive a graded ticket for it. When this is done the elevator company must at some future time deliver to him, either on track in his car, or into a terminal elevator, grain of equal quality and net weight as the ticket shows to have been delivered. A farmer storing grain in this way has the right to demand that, in shipping this grain, the shipping bill shall be made out according to his direction. Once the grain is unloaded and the certificate of grade and weights issued, he may demand the delivery of his grain from the elevator company by handing over all tickets and paying the storage charges. If at the time of making delivery to the country elevator he is not satisfied with the grade given by the local operator, he can have a sample drawn in a way similar to that described when discussing cash grain. The decision of the chief inspector is then binding with both parties.

Special Bin Ticket.

If the elevator company has an empty bin that they are willing to place at the disposal of the shipper this grain may be stored in such a manner as to preserve its identity, in which case the elevator need

issue only a special bin ticket guaranteeing to preserve the identity and to deliver the same grain in car load lots to the shipper on his demand. The elevator companies are not responsible for the grade when grain is handled in this way; and in respect to dockage, it is the general custom of the elevator companies to allow the owner of the grain to stand his own dockage at Winnipeg. There, only enough dockage is taken to safeguard against any loss through waste or shrinkage in handling. This in the majority of cases amounts to about one per cent.

Car Load Lots.

In disposing of car load lots a farmer may, if he so desires, sell to the company that is handling his grain for him. In so doing, once he furnishes a car this company will likely be able to pay him Fort William prices, less elevator fees, transportation charges, weighing and inspection fees, and one cent a bushel commission. There is nothing, however, to compel a man to sell to any particular company; and no elevator company may attach a condition that they will furnish storage room only on the understanding that the owner must sell to them. If he desires he may sell in several other ways. He can sell his car load to what is described as a track buyer, a man having a license to buy grain in car load lots on track. Such a buyer may either buy for himself or he may act as an agent for another licensed firm. In selling grain to a track buyer the law requires that a certain form of contract shall be used. This contract sets forth the full particulars of the transaction and also shows that the buyer has a license, as the license number will be found stamped upon the form. A farmer when selling grain in this way should always have this contract made out in writing and satisfy himself that the party he is doing business with is himself licensed or the agent of a licensed firm. He should always remember that once he parts with the custody of a shipping bill he has virtually surrendered possession of his car. This is important, since occasionally persons having no license and purporting to be track buyers, fail to give a satisfactory settlement for grain purchased. In selling grain in this way a farmer should always demand a cash advance if he is dealing with a party in his own neighborhood. If dealing with an outsider he should attach a draft to the shipping bill for at least 75 per cent. of the estimated value of the grain. He may then feel reasonably sure that he will be protected for the balance due him by the bond furnished by the buyer. When selling grain in carload lots a farmer can, generally speaking, sell on track at the closing price of the market that day but if he does not so desire he can sell and have the price stated for some future delivery.

Commission Agents.

If a farmer does not wish to sell he can have his grain shipped forward to a commission firm to be handled by them in such manner as he may direct. There are various ways in which he may have his grain handled, and it is a wise precaution for him to write his commission men, giving them full particulars as to how he wishes his consignment disposed of.

To try and illustrate this and also to have a short discussion on our grading system, I am going to try and follow a farmer's car from point of shipment until it is finally unloaded into the terminal elevator. We will suppose a farmer has a carload of grain for sale and he wishes to ship it forward instead of selling it locally. In the first place the Act now provides him with the means of obtaining a car. The railway companies have to provide car order books in which all applicants for cars must register their orders. No one is allowed to have more than one unfilled order on the book at any one time, and all cars must be supplied to applicants in the order in which they appear on the book. An applicant may order his car spotted at an elevator, flat warehouse, loading platform or siding. He may also order any sized car that the railway company may have in commission, and the railway company in supplying his order must give him the first car of the desired size that is available for distribution. No applicant for cars can sell or transfer his right, or load any car out of his turn, or any car that had not been allotted to him. If he does he leaves himself liable to a heavy penalty. If the farmer has stored his grain in an elevator and received a graded ticket he need not trouble himself any further in reference to grade or weight, but if he has put it in an elevator in a special bin, then, to be able to identify his grain he should, at the time of delivery demand that the operator of such elevator furnish some kind of a receptacle, that a sample be drawn from each load and put into this receptacle, and that it be locked or sealed up so that no one may be able to tamper with its contents. The most effective way to do this is to have the elevator company provide a tin box, the farmer himself furnishing the padlock and retaining the key until delivery of his grain is completed.

Wise Precautions.

If car is loaded over the loading platform he has to assume all the risks and responsibilities that the elevator company assume, so that there are several things that he should be careful about. Before he starts to load his car he should carefully examine it and see if it is in fit and proper condition to carry grain safely. If the car is in a dangerous condition he has the right to refuse it. If it requires only a little fixing, the shipper should see that this is done carefully and well, because, while the railway companies are responsible for any leaks or losses in transit, it is sometimes hard to prove that such have occurred, and it is very often difficult to get the railway companies to settle. Prevention in such a case is better than cure. After the car is in fit condition to load you should, when putting the grain into it, provide some kind of a receptacle on the platform and place a fair sample from each load in it. Then some means should be taken whereby you can prove that this is a fair and true sample of the car and that it has been kept in such a manner that there is no danger of it having been tampered with. If you are weighing your grain as you load it keep a record of each load and if possible obtain a statement from the party doing the weighing and preserve these for future reference. If you do not weigh your grain, keep a record of the number of your loads and after the car is loaded, level it off and note how near it comes to the load line

of the kind of grain you are shipping. Mark it down, and if possible have some one with you who can verify your statement. It is also well to shovel the grain back a little from the door so that none may be thrown out in the movement of the car. A car should be loaded up to its stencilled capacity, as the railway companies will collect freight on that amount whether it is full or not. A car should never be loaded more than ten per cent. above its carrying capacity, as this makes it more liable to leak or to break down. Besides the railway company will charge you a rate and a half for all excess weight.

Billing Out.

When your car is loaded you can have it billed out in several ways. If you make this bill out to your own order, that is, by placing your name on the bill as the shipper, and to your own advice, the certificate of grade and weight would be returned direct to you. By doing this the sale of the grain may be delayed. A better way is for you to ship to your own order and advise whomsoever you may be consigning to for sale. After you have done this, to make the bill negotiable, write your name across the back of it and send it down to the commission firm. Now, in this case, the commission firm virtually have possession of the car, so that you should write and let them know exactly how you wish it handled. It is generally a wise proceeding to attach a draft to this bill for a large per cent. of the estimated value of the car. This can be done as a rule in the most satisfactory way through your local bank.

Methods of Marketing.

You might naturally ask in what different ways you can have this grain handled. You can have it sold on the day of its arrival in Winnipeg once the certificate of grade is issued, and in almost every case such sale could be made at the closing price of the market that day. If you did not desire to sell then, you could instruct your commission man to let your car go forward into store and sell once he had received the outturn of weight, or if you prefer you could ask him to hold your grain and sell it before the expiration of free storage which is ten days in a terminal elevator. This gives you that amount of time in which to take your choice of the market. It is often stated that a farmer cannot sell grain except on certain hours fixed by the members of the grain exchange, but this is wrong. Once your commission men have the certificate of grade and weight, your grain is what we call "spot grain" and can be sold at any time of the day whether at the session of the market or after it is closed. There is nothing to hinder anyone selling his grain as he sees fit—he can ship it down to the terminal elevators, have it stored in his own name, and if he can find a buyer, sell it irrespective of the grain exchange at all. He can ship it through all rail if he can find a buyer in eastern Canada with whom he can deal direct. If he has enough grain to make a consignment he can have it shipped across the lakes or taken all rail, loaded on an ocean vessel and sold directly to the buyer in Liverpool. The reason that grain goes through the grain exchange is simply that it has been found the

best medium in which to do business. There buyers and sellers come together and are enabled to do business in a more satisfactory manner than would be possible otherwise.

Work of Inspection.

The farmer's car has arrived in Winnipeg. We shall consider how it is handled from there until it is unloaded at the terminal point. When it arrives in the yard the railway company furnish the inspection department with the shipping bill, then the men go out into the yards and draw samples for inspection purposes. It has been stated that the men employed in the inspection department do not draw the samples in a careful and satisfactory way, that no proper supervision is kept of them and the manner in which they do their work and that in many cases a poor class of men is employed. Now, no matter how good the inspectors are, unless they receive proper samples they cannot do satisfactory work, as all they have to go on is the sample that is furnished them. It is therefore absolutely necessary that the sampling be done in a careful and systematic way. When these men go into the yards they are in every case in charge of a foreman. This foreman is one who has been in the employ of the inspection department for years and a man in whom they must have absolute confidence. He has charge of the men who are to draw the samples. When they arrive at a car they look it over to see if there are any signs of a leak, or if it has suffered any damage in transit. They mark down on a little pasteboard card the initial letters and number of the car; they then examine the seal and note whether it has been broken. The man who draws the sample places a short ladder against the door of the car, climbs in and starts his work. He draws the samples with what we call a sticker, a long brass tube with a sharp point. This is pressed down through the grain to the floor of the car. After striking the floor the handle is turned and the grain then runs into this tube from every height until it is filled up. It is then withdrawn and the grain it contains emptied in a heap on a piece of sacking laid at the car door for that purpose. Samples are drawn in this way from each of the four corners of the car, then one from each side of the car and one from the centre. The last three are never drawn until the foreman comes to the car and sees them drawn himself. When that work is done he examines each sample as it lies there before him. If he finds they are uniform he bunches them together, fills up the sample bag that he has for that purpose, and then places in the same bag a card containing the particulars of the car. If he finds that the samples are not uniform he instructs the man in the car to draw a fresh sample. If he is convinced that this car has been deliberately loaded for the purpose of trying to deceive the inspector, or is what we call a "plugged" car, the poorest sample that can be found in that car is taken and the car then graded down to the lowest sample found in it. Once they have done that, they leave the car, shut the door again and seal it up. I might also have stated that they take a record of how near the load line the car is loaded. After this is done and they have got through all the rest of their work, the samples from all cars are taken up to the office of the

chief inspector, carried into the inspector's office and the deputy inspector then commences the grading. He takes a sample, empties it out, and after careful examination marks down what he thinks it will grade. To determine the dockage he takes a certain quantity of grain and weighs it carefully. After weighing it is then sieved through a sieve prescribed by law. The dirt is weighed and the amount per hundred computed. After this work is done the sample is put into a tin box with the number of the car and filed away for future reference, and it is held by the inspection department from three weeks to two months, according to the office space at their command. The car is now graded and a certificate to that effect is made out and sent over to whatever commission house may be handling it.

I said before that certain precautions could be taken to check up the work of the inspection department. I advised that when you ship a car you should write a letter of advice to your commission men. What should that letter have contained? First, the shipping bill made out so that it could be negotiated, then your instructions as to how you wished the car handled, and finally your own opinion regarding the grade. You may also advise them to ask for a reinspection if it does not equal the grade you expect.

Reinspection.

Now, what is a reinspection. Your commission man goes down to the inspection office and asks for a sample of your car. This sample is produced and turned out on the table for his inspection. If you are one of those who believe that this work is not done in a careful manner, what have you to prove that that is a fair sample of your car or not? I advised when you were shipping this car that if it was special binned through an elevator, you could have had a proper sample of it drawn at the time of making delivery and preserved, or if you loaded over the loading platform that you might have drawn samples yourself in the same careful way. Now, we will presume that you have done so, and in this letter that you have written you say to your commission man that you are sending him forward a sample of your car which is a fair and honest one, and that if your car does not grade as you expect, when he goes down to ask for a reinspection you wish him to take this sample with him and compare it with the sample in the possession of the inspection department. When your commission man has examined this sample and called for a reinspection it is generally done by Mr. Horn, but sometimes by his brother, who is his chief assistant. These men have the power to change the grade of this car and to have a new certificate issued. If they decide that your car has been properly graded then the original certificate stands good. What other steps could you have taken? You might have gone further in this letter and said that if after reinspection the desired grade was not obtained you wished to call for a survey. A survey is held by making a deposit of \$3.00 to the secretary of the survey board, who then notifies three members of that board that a survey has been called. A survey board consists of twelve members, six of whom are nominated by the Winnipeg Board of Trade, and six by the three western provincial governments. While this is so, the board actually consists

of members of the grain exchange, and the reason of that is, that a survey must be held before the car is unloaded and the identity of the grain lost, and to make this possible men must be appointed who can be quickly reached, and who have the necessary expert knowledge of grain to consider, and if necessary revise and alter the finding of the chief inspector. We must never forget that if we had men on that survey board that were not able and capable of doing the work in a proper and satisfactory way that it would cause endless loss and confusion, not only to the grain dealers but to the producers as well. The only alternative that there may be to change the constitution of the survey board, if its present form is unsatisfactory to the producer, is to have a permanent board, appointed by the government, whose duties will be to perform the work now done by the present survey board. To do this would entail a very large expenditure and would necessitate the raising of the fees already collected for the purpose of inspection and weighing.

Duties of Survey Board.

When your sample goes before this survey board they are not supposed to know anything about what grade it got from the inspection department. They are simply asked to use their best judgment as to what the sample should grade, and what amount of dockage it should get, and when they reach a decision it is handed to the secretary, who hands it then into the inspection department. If they alter the decision of the inspection department, a new certificate is then made out according to the finding of the board; if not, the original certificate stands; but in any case their decision is final. If they have altered the decision of the inspection department, the \$3.00 is returned to the shipper; if not, it is retained for the purpose of paying each member of the board \$1.00 for their services. If the owner of the grain so desires he can demand that fresh samples be drawn for the purpose of this survey. After this work is completed the car is then ready to be unloaded.

When it arrives at the terminals it is run in along with cars of a similar grade to whichever elevator it is going to be unloaded into. The car is then opened and emptied for the purpose of being weighed, and the inspection department, having full control of the weighing and binning of grain, sees that this grain is up to the grade it bears. If it is not they have the power to hold the car, preserve its identity, draw fresh samples and notify the department at Winnipeg that some mistake must have occurred in the grading. If all is right, the grain is taken into the building, elevated to the top for the purpose of being weighed under government supervision, and a weight certificate is made out accordingly. The grain is then put into a bin of the same grade, no mixing being allowed.

Shipping from Terminals.

It is often stated that a larger amount of the higher grades are shipped out of the terminal house than are received into them, but while such statements have been made, no one has ever produced evidence sufficient to prove that such is done. When the grain in a

terminal elevator is sold and is ordered out by either boat or car, it is put out under the inspection of the department there, and a certificate setting forth that a certain shipment contained in the hold of certain vessels or loaded into certain cars has been shipped out as a certain grade. That certificate is furnished to the buyer, who buys subject to grade. Now, we must assume that the buyers of our grain are familiar with our grades, and know to what grade the grain they buy properly belongs. And if the grain they receive is of a lower grade than the certificate issued by the inspection department claims that it is the purchaser would certainly refuse to accept and pay for it at the price of higher grade. That would occur if our grain were being mixed in the terminals, and in such case we certainly should long ago have heard some strong protests from the people who buy our wheat. As a matter of fact, we find that the eastern miller and the old country buyer, according to their own statements, are well satisfied with our system of grading and have testified that they invariably get the grade of grain for which the certificate calls. The only protest we have had is in regard to the amount of dirt in the grain, and we have had complaints that some consignments are not as clean as they think they ought to be.

Sample Market.

Some discussion has arisen over the question of having a sample market in Winnipeg, and I may say in reference to that question that The Grain Act was amended in 1908 so that after the 15th day of December in any year, the warehouse commissioner has power to grant special bin privileges in the terminal elevators at Fort William and Port Arthur, and shippers have the right to bill their cars to Winnipeg for orders by paying a stopover charge of \$3 or \$4 a car. So far we find that no one has taken any advantage of these amendments, and I doubt very much whether a sample market in Winnipeg can be of any use unless very large milling interests are established there, or we alter the system of handling our grain and allow the building and operation of mixing houses at terminal points, because a sample market is of use only when the seller of grain can get a premium above the price that his car would sell for on grade, and he can do so only when there is a milling demand for it, or when it can be sent down to a mixing house to be used for the purpose of making up certain grades that may be required at that time.

Any farmer who has not established any communication with a reputable grain commission firm can depend absolutely on the Saskatchewan Co-operative Elevator Company, which has a commission department in Winnipeg, as well as having an ever increasing line of initial elevators at points throughout the province. While, of course, the company can only handle and ship grain for farmers who are within reach of one of its elevators its commission department can sell on the Winnipeg Grain Exchange the grain of any farmer in Saskatchewan who chooses to consign it to their order or advice.

The Saskatchewan Co-operative Elevator Company is the direct outcome of the principle recognised by grain producers that the Government should assist them to form some organisation that would enable them to compete with the existing line elevator and commission companies in the handling and marketing of their grain.

MUNICIPALITIES SEED GRAIN ACT.

The following is a synopsis of "The Municipalities Seed Grain Act" passed at the 1911 session of the provincial Legislature:

The council of any municipality or district *may* on the same day and at one sitting give three readings to and pass a bylaw empowering them to advance seed grain on credit to resident farmers, and to borrow money upon the promissory note of the municipality or district (signed by the reeve or chairman and the secretary treasurer) for the purchasing of seed grain.

Notes given by the municipality or district must not bear interest at more than eight per cent. per annum.

The government may upon application and upon certain terms and conditions guarantee the repayment of any money (principal and interest) borrowed by the municipality or district under the bylaw referred to.

No limit is placed upon the amount that a council may borrow, but it may not supply seed to a greater value than \$200 to any one farmer.

Money borrowed by a council under a seed grain bylaw is to be kept quite distinct and accounted for separately from all other funds of the municipality or district.

The council may purchase seed grain where it pleases, from whom it pleases, and may pay for it what it pleases. The purchase and distribution of the grain, however, must be carried on only by the council or by their appointee.

No seed grain may be advanced for sowing upon land that is not patented.

No advance of seed grain may be made to a tenant or purchaser under agreement of sale except with the consent of the owner, and the owner must also go on a joint and several note with the tenant for the purchase price.

Cash may not be loaned under the bylaw to any farmer either to enable him to purchase his own seed or for any other purposes whatsoever. Nor may the funds borrowed by the council for seed grain purchase be used for any other purpose.

The council may only charge for the seed grain a price sufficient to meet the cost thereof together with the reasonable expenses of the distribution. The interest charged by the council is to be the same as that paid by it and may not exceed eight per cent. per annum.

The settlement taken by the council for the seed grain advanced is to be a note payable on demand, and from the date the seed grain is supplied to a farmer the purchase price of it will become a tax on the land on which it is supposed to be sown, and collection of the amount may be made just as in the case of any municipal or school taxes in arrears.

BEST METHODS OF CROP PRODUCTION.

A summarised report of the answers by crop correspondents to a list of questions sent out in the fall of 1910 indicates in some measure the tillage methods pursued, those which contributed to the best results and which may with advantage be more generally adopted.

Summerfallow Best.

The replies to the first query: "How was the field prepared for crop that gave, this year, the best yield you know of?" clearly emphasise the premier place which summerfallow holds in this regard. There is a general and evident tendency indorsed by the past year's experience to commence the preparation of the land at an earlier date than usual. Land fallowed early in June is reported as having given the most satisfactory returns, and average increases of from five to ten bushels per acre over the averages for the townships. In crop districts numbers 1, 2, 4 and 5 more than two-thirds of the best crops are stated in the returns to have been harvested off summerfallowed land. In parts of district 2 crops on summerfallow stood the drought so well that the farmers are reported as having greater confidence in the country than they had ever gained during more favourable seasons, inasmuch as they have had conclusive proof that with proper methods of cultivation there is no reason to dread an occasional dry season. A correspondent in the Pense district states that as far as the crops on summerfallow land indicated there was nothing to show that 1910 was a dry year. The threshing returns were, he stated, a pleasant surprise to the farmers, most of the crop on summerfallow going 40 bushels to the acre and oats as high as 100 bushels.

Methods of Tillage.

The majority follow the approved method of ploughing deep before the last of June, surface cultivating during the growing season and packing where land became too loose and liable to drift. Methods of after cultivation vary considerably, however. "Packing after both the plough and seeder," "harrowing in the fall and spring," "discing in the fall and packing in the spring," "harrowing after each rainfall and packing in the fall" are amongst some of the forms of after cultivation recommended.

It is noticeable that the majority emphasise the importance of packing after the drill. Some packed both before and after seeding, a few used the packer after the grain was up. A correspondent reported a yield of 130 bushels of Banner oats on land that had been sown both ways and packed twice, but as this is only a single instance it would not prove that seeding crosswise is to be regarded as a profitable proceeding. Seeding early is put down as a factor in the obtaining of better yields and quality, but it does not appear from the reports that "early seeding" can be laid down as an axiom inasmuch as causes of failure are in some instances attributed to too early sowing. Much depends upon the weather.

Breaking comes next in order of the forms of tillage which insured the greatest measure of success. As early as possible in June before the rainy season commenced was, as in the case of summerfallow, found to be the most suitable time at which breaking should be done. Those who followed this course now regard it as the best. Backsetting rewarded the extra labour, but comparatively little of this form of cultivation was done. In the more newly settled districts (2, 8 and 9) the ex-

perience of the year shows that the best crops were obtained off land recently broken. The form of after cultivation varies much according to the variety of the implements in the possession of the farmers. Packing and harrowing after the drill seems to warrant general adoption from the satisfactory results achieved. A few other of the methods may be here briefly indicated: "early shallow breaking, deep backsetting, well worked and packed or planked," "plough in May, backset in September, disc and harrow in spring," "disc before and drag or harrow before and after seeding," "double disc fall and spring, packing before and after seeding," "disc in fall, harrow and pack in spring," "surface work and pack in fall," "plank or float and harrow after seeding," "spring breaking and fall cultivation."

Burned-over stubble, fall and spring ploughing took next following places amongst the kinds of cultivation which had resulted in satisfactory crops.

In no instance was a direct failure reported on well prepared fallow, a decline in yield or grade being attributable to a cause, such as damage by cut worm, more or less independent of the nature of the tillage, or to the fact that the approved method of fallow cultivation had not been followed.

FARM FORESTRY.

(By Norman M. Ross, Superintendent Forestry Farm, Indian Head.)

The subject assigned to me is "Farm Forestry." This is a very wide subject. The term "forestry" to the professional forester means a business which must be a paying business, just as agriculture means a business to the farmer,—so that when "farm forestry" is mentioned the forester at once thinks of plantations set out with a view to obtaining direct returns, such as fuel, fencing material, etc. This part of farm forestry is of immense importance on the prairies, but it has not yet received very much consideration from the farmers. The average settler is concerned more directly at first in establishing plantations for shelter purposes and the possibility of growing fuel does not generally appeal to him. The results seem so far distant that he imagines it would not be a paying proposition. While this is quite untrue, I shall not take time to disprove it here but propose to consider only the planting and establishment of shelter belts and windbreaks as being of most immediate concern.

As is generally known the "forestry branch" has for the past six or seven years been assisting settlers to establish plantations and windbreaks by supplying large numbers of seedlings and cuttings free of charge under certain regulations to insure the subsequent success of the plantings. On the nursery station at Indian Head the trees are grown from seed and cuttings and from there distributed.

Raising Seedlings and Planting.

I will outline briefly our method of raising the young stock and the planting and care of the plantations after the seedlings are sent out.

The Manitoba maple, green ash and elm are the three varieties grown most extensively from seed. The willows and Russian poplars are propagated from slips or cuttings. Dakota cottonwood seedlings which we distribute in considerable numbers, are imported from Dakota and not grown on the nursery.

The seed of ash is grown in the fall, that of maple usually half in the fall and half in the spring, as very frequently the fall grown seedlings, which germinate very readily, may be injured by late spring frosts. The elm seed is sown in July as soon as it is ripe. This seed is all sown in drills about 30 inches apart to allow of frequent horse cultivating during the summer. This cultivation is stopped early in August, otherwise late growth is induced and the young shoots of the seedlings are not sufficiently ripened to withstand the winter frosts.

The maple seedlings are dug when one year old, the ash and elm remain in the nursery two summers. All stock on the nursery intended for spring distribution is dug in the preceding fall. We have a special machine which cuts under the roots, loosening the ground so as to permit of the seedlings being easily pulled up. They are then tied in bundles and heeled in for the winter. In the spring they are taken up again, tied in the necessary bundles, packed in wet moss and sewn up in sacking. They are then ready for shipment to the different applicants.

Free Distribution Regulations.

Trees are only furnished to those persons who, after making application for them, have been visited by our inspectors and found to have prepared their ground in a proper manner. We find that to ensure success in tree planting, the one point which must above all others be insisted upon is a most thorough cultivation of the soil before planting. We absolutely refuse to supply trees for planting on any stubble land or on insufficiently prepared ground of any kind. Summerfallow is considered the best preparation; garden, potato and root ground is also satisfactory; occasionally backsetting may have been well enough done, but in the majority of cases we find that all the grass is not thoroughly killed out on ordinary backsetting. In this climate trees and grass do not agree, at least in the early stages of a plantation.

Provided all conditions are satisfactory trees are supplied. They are set out in rows four feet apart and four feet apart in the rows. This permits of cultivation for two or three years, after which the plantation should take care of itself. A belt of trees should never be set very close to the buildings, as, during the winter, large drifts of snow will accumulate on the inside of the belts and inconvenience the operations about the buildings. Furthermore trees should never be set within 100 feet of the buildings. We find that as the trees afford each other mutual protection, the most successful belts are those consisting of from ten to twenty rows. If only two or three rows are planted the individual trees are always more or less exposed and require more cultivation to keep them in a thrifty condition. The actual planting is only a small matter. We advise planting in a deep plough furrow and keeping in mind the important point that the soil

must be firmly tramped around the roots. After planting the ground must be given frequent surface cultivation with a single horse cultivator. This is not merely to keep down weeds, but more especially to conserve the moisture. Cultivation should cease early in August, but no weed should be allowed to go to seed. Late cultivation accounts for a good deal of what is known as winter killing. This of course is more frequent after a wet, cold fall, as under such conditions the new growth never matures as early as in a dryer season. As soon as the trees have grown so close that cultivation between the rows is impossible the plantation is better left alone.

Some Mistakes Made.

Many men think it necessary to prune, but this is the greatest mistake that can be made. Indiscriminate pruning in a shelter plantation is likely to result in more damage than anything else. It is well known that a plantation in which the trees are all pruned up to single stems affords but very little obstruction to the wind, and in consequence a pruned belt is of very little value for shelter. Again, pruning admits too much sunlight to the ground and allows grass and weeds to grow. The evaporation of moisture in a pruned belt is also much greater. In fact, pruning induces most unfavorable conditions and should never be done unless in exceptional cases. Sometimes a valuable tree is crowded by another of an inferior variety, which, if allowed to grow undisturbed, would eventually kill the former. In this case it would be advisable to cut the fast growing tree back somewhat so as to allow more light and room for a better development of the more valuable variety.

In belts consisting of single rows it is often very advisable to practice a kind of pruning or trimming in order to make the growth more branchy and thicker. This trimming consists in cutting off the ends of the growing side branches about three or four feet from the stem. This induces the formation of other side branches and after a few years results in a very dense shelter or windbreak. The willows probably respond to this kind of trimming better than most other varieties of trees. Nearly all hedges of lower growing shrubs, such as caragana, lilac, honeysuckle, etc., are benefited by this trimming. This trimming is usually done in June or July.

Evergreens.

There is considerable inquiry for information regarding evergreens. This class of tree is naturally most desirable, as the leaves remain green throughout the whole year. The following varieties are quite hardy in Saskatchewan: native white spruce, Scotch pine, jack pine (*pinus divaricata*), lodgepole pine (*pinus murrayana*), Colorado spruce.

The white spruce is undoubtedly the best all round kind to plant as it is perfectly hardy and forms a tree of good shape. The roots are comparatively shallow and consequently this variety can be transplanted more readily than can the pines which form strong tap roots.

The evergreens are at first slow growers but after about five years the growth is much more rapid and will in a few years overtop maples and ash of the same age.

During the first two winters after planting evergreens must receive some protection from the sun, the most damage from which is done during late February and March, the bright sun at this season literally burning up the needles. Unless covered with a good bank of snow some shade should be given the young plants at this time. Spruce and pine should not be mixed in a plantation of cottonwoods, willows and maples, as these varieties grow very quickly at first and would soon smother out the young evergreens. They should, however, be set out where an established belt of such trees would afford them some protection without directly overshadowing them.

PLANNING THE FARMSTEAD AND BUILDINGS.

(Article by A. F. Mantle, Deputy Minister of Agriculture.)

A problem that sooner or later confronts every farmer on the western plains is that of the erection of suitable farm buildings. To many a farmer in the older civilisations this problem never presents itself. He may be a tenant farmer and use the buildings which have been the equipment of the farm for a generation past. Even if these have to be renewed or others added the problem rests with the owner and not with the tenant who must take what is given to him. But here, where happily there are few tenant farmers and where most of the land is still occupied by the original owner, each is confronted sooner or later with this problem of building.

A man at the outset (unless he is a capitalist) puts up just such temporary structures as will shelter himself, his family perhaps, and his stock. His intention is to equip the farm with creditable buildings at a later date as means will allow, and put the original structures to humbler uses, such as hen houses, pig pens, blacksmith shop, granaries, etc.

Permanent Units vs. Piecemeal Work.

We believe this to be a wiser plan than to attempt a portion of the permanent buildings at the outset with the intention of adding to them at a later date. With frame buildings additions are seldom very satisfactory and a house, the two halves of which were builded five or ten years apart, is not apt to prove a warm and comfortable place. A person's ideas change as time passes and the plan that was in view when the original portion of each building was erected is not likely to be satisfactory when the addition is to be built. So there are architectural and structural reasons for not planning to erect the permanent buildings piecemeal or by halves. Put up temporary structures first—such as can be used later on as outbuildings, then add a permanent unit—barn house, granary, as the case may be—as circumstances call for it and finances permit.

Question of Site.

A mistake too often made, even when a start has been made along these lines, is in planning the temporary house and stable on the sites that should ultimately be occupied by the permanent dwelling and barn. The writer once stayed over night with a farmer in southern Saskatchewan whose temporary buildings were very favourably located. This point was raised and the question asked as to whether a \$200 three roomed shack had not been placed just where a \$3,000 house should later on be located. This man was awake to the situation, however, for he immediately took us across the road onto another quarter and there showed us an even better site and his preparations for permanent buildings. Ten acres in the corner of the quarter had been staked off, the sites of the barn and dwelling fixed and, as the rest of the quarter was broken, the stone on it was hauled direct to these sites and piled in readiness for use in foundations. Nor was this all, for land had been broken within the ten acre plot for a liberal shelter belt at the correct distance from the building sites. This had been broken thin and backset the previous summer and when seen was in crop to potatoes.

Plan Right.

Such a handling of the situation constitutes scientific homemaking. When that man gets through his neighbours will wonder how he comes to have such a fine place and such a well grown belt of trees while his buildings are yet so new. It will simply be because he planned that way. In this business of homemaking more than in any other part of farming, a definite, well thought plan is necessary. Good intentions, hard work, even plenty of cash, are not alone sufficient, but must be coupled with forethought. In some things about farming we can make out even if we take time by the "fetlock" provided we work thoroughly. In home building we must take time by the "forelock" if a harmonious result is to be secured. The appearance of a farmstead after the permanent buildings are erected will always indicate the extent to which the whole scheme existed in the mind of the builder before operation commenced.

There is another extreme in this matter though. We recall the case of a wealthy city man who decided to own, equip and operate a large farm. A suitable building site was located and staked out. A plan of this site was made as regards area and dimensions but not as regards altitudes or levels. The buildings were all located on his plan, yards, wells, gardens, small fruits, lawns, drives and lanes were all laid out, but with a fine disregard for how Nature had left the land in question. The contract for the buildings was let and work proceeded with, but not until the rainy season came in did it develop that the house and the implement building had been located where depressions occurred and, in consequence, the cellar of the house filled with water and a foot of water lay in the implement shed. This was a case where a good building site was spoiled by an artificial arrangement of the buildings that did not fit in with the levels of the plot of land in question.

Importance of Water Supply.

It is usually advisable to be sure of the water supply before committing yourself to a site too definitely, such as by the erection of a barn on it. Decide where the well should be in relation to the house and barn as you propose to put them, then sink the well. If you secure water well and good; you can proceed to build with an easy mind. If water is not found a rearrangement of the locations or an entirely new site may be required. The water supply is the one feature of the farmstead that is outside the farmer's control or arrangement, so be sure of that first then cut your coat according to your cloth.

Outline of General Scheme.

Preferences vary as to what point of the compass the house and barn respectively should face, and probably this question, in the case of the house at least, is of less importance than the site itself. Other things being equal, however, we should face the house to the east and set the barn east and west.

We should face the house to the east because we should build a square or rectangular house with at least four rooms downstairs. Of these the parlour would be in the front of the house and in the south-east corner, the dining or living room behind it and in the south-west corner with windows in two walls; the kitchen would then occupy the north-west corner which is the coolest both summer and winter. (The kitchen needs the cool location in summer and can best stand it in winter on account of having the range to heat it.) The fourth room, be it a bedroom, den, study, office, library, sewing room, nursery or what-not, would then occupy the north-east corner. The next best arrangement is to face the house to the south with the rooms in the same relation to each other.

Our reason for placing the barn with its ends east and west is solely in order that the interior may receive the maximum of sunlight in the winter. This can be secured if fanlights are placed above the doors east and west, with possibly a window flanking the doors on each side, and the whole south side is studded with windows as numerous and large as structural conditions will admit of. These windows should be placed sufficiently high in the wall that they will not shed light directly into the eyes of horses facing them, and will enable the sun's rays to reach the centre passage and stalls on the north side of the building. To secure this result an extra high ceiling is needed or else the loft floor may be sloped up for eight feet or so along the south side of the building.